Appendix A: Case Study Problem Statements for Team Projects

Common Note for All Case Study Problem Statements:

GoodMead Hospital's hospital management system (HMS)—part of the running thread for examples in this book for modeling with the UML

OzAir Airline, Agro Farm, and Desi Travels—experiential learning for medium- to large-sized team projects for modeling with the UML

Lucky Insurance—experiential learning for large and collaborative team projects for modeling with the UML

The case study problem statements appearing here are as close to real-life software engineering projects as is possible in an educational setting. Based on the underlying philosophy of experiential learning, these problem statements are put together for students learning UML-based modeling in all three modeling spaces (Model of Problem Space [MOPS], Model of Solution Space [MOSS], and Model of Architecture Space [MOAS]).

An important part of these case studies is that they are geared toward students working on a team of software engineers. The emphasis in these projects is on the word "team." This is because students need to learn early and quickly that a large amount of real-life modeling and software development work is undertaken in teams.

Typically, software projects start with a business problem or an opportunity that is discussed and debated to arrive at a common understanding of the overall scenario. This scenario provides the business context for the software engineering project. Initially, this scenario is a couple of descriptive pages, usually not fully developed (in fact, incomplete), sometimes confusing, and always changing.

The problem statements given below describe such scenarios. These case study problem statements set the business context for the UML-based software modeling exercises undertaken by students in teams. These problem statements are slightly better organized than what you will discover at the end of the first brainstorming meeting. However, they are purposefully not very tightly defined.

The main idea here is to give you, the students, a basic sketch of the business and what it wants from the software project. You are then free to develop the scenario further depending on how you understand the context in which the project is to be executed. The focus of these case studies is ***not*** *the accuracy of the problem domain itself but rather how the students understand, model, and express themselves through UML.*

The requirements for these case study problems start by a description of the business situation. This business situation provides the basis to identify the key business objectives for the project. The software engineering project starts from there onward—following the software development life cycle (including Agile), creating the MOPS, MOSS, and MOAS, and utilizing the tools and techniques discussed in this book.

*The software system in the following case studies is to be developed by a group of consultants (****You****). The scope of this book is limited to software modeling. That's why actual implementation of the solution (i.e., development, testing, and deployment) is not expected in these case studies. Eventually, however, the solutions you model are implemented in a technical environment (e.g., Java-based environment, together with an appropriate back-end database such as Oracle or SQLserver, with cloud service from providers such as Amazon AWS or Microsoft Azure). Support for mobile processes is also an integral part of these projects, although that implementation is also beyond the scope of this exercise.*

Your project team is made up to four to six team members. Assume you have some experience in the software industry. You are involved in creating and successfully deploying software solutions for various types and sizes of projects across a range of organizations. You are capable of understanding the business objectives of the project keeping the business context in mind; you are able to extract and document user requirements for the project; then, based on the business context, you are able to decide the type and size of the software engineering project. Within that project, you have the skills and tools to model, architect, design, and deploy the solutions. You also verify and validate the quality of your models and plan and organize the testing of the eventual solution.

Students are encouraged to delve deeper into the requirements given below; they can brainstorm in a workshop setting to ascertain what the user really wants out of the system and how the user is going to use the system to achieve his/her business goals. The students should be able to appreciate how these requirements can be further correctly, completely, and consistently modeled using the software engineering fundamentals together with the UML.

GoodMead—Hospital Management System

[Special Note: This particular case study on a hospital management system (HMS) is the basis for the running example in the book. Reading this case study problem statement gives you, the readers, a good background for the examples. Advanced students can further read and modify this case study problem statement and use it to develop more detailed and additional examples.]

GoodMead is a ***hypothetical*** large hospital in a metro city within a fully developed country (say, Sydney, Australia). This hospital provides diverse types of health-related services in pediatrics, gynecology and obstetrics, orthopedics, radiology, dentistry, sports medicine, and so on.

A detailed review of the current systems and methods of the hospital was carried out. The review is a part of a comprehensive e-business strategy aimed at modernizing the hospital's information technologies and systems. This included a review of the following processes: patient admission, staff scheduling, maintaining patient records, managing laboratory test results, identifying and utilizing historical medical records, managing drugs, managing inventory, allocating funds, and utilizing facilities.

As a result of the review and ensuing discussions by the board of GoodMead, a new "program of work" has been commissioned. This program of work comprises key IT projects dealing with new development, integration, transformation, and extension activities. The aim is to provide a fully integrated software solution that is on the cloud. Cost effectiveness and efficiency in providing patient services, effective use of hospital resources, and compliance with current and upcoming regulations are some of the key goals of this strategy.

The new software development project is approved by the board in conjunction with a reputed consulting company—MethodScience. The project is called HMS (hospital management system). HMS has a dedicated business objective, separate budget, a project director, three project managers, and a team of analysts, designers, developers, and testers.

The brief given to this HMS project is to develop an Internet-enabled, cloud-based software solution that will handle all current and future hospital management processes. Successful implementation of HMS should result in ease of access to patients and staff, quicker registration and tracking of patients' details, and in general a smoother day-to-day operation. HMS is aimed at providing value to patients, staff, administrators, and regulators. HMS is also meant to enhance collaboration of GoodMead with other business entities (such as pharmacies, laboratories, and police and ambulance services).

The project director for the HMS is working closely with the principal consultant of MethodScience to seek advice on software development processes, architectural frameworks, software engineering approach (object-oriented), design standards (they have agreed on the UML 2.5), CASE tools for modeling (they have agreed on StarUML, although some users are comfortable using Visio), and testing approaches. The decision as to which implementation technology should be used is yet to be made by the technical architects of the system (e.g., whether the system will be implemented in .NET or J2EE and which corresponding cloud platform will be used). Expertise from the medical administration domain is sought to capture and enhance the hospital's business processes and ensure legal compliance.

A recent senior level workshop carried out over two days included the program director, all three project managers, principal consultant, senior business architects, consulting enterprise architects, and special advisors from the field of medical technology. The following summarizes the resolutions in point form:

1. The hospital has a large outpatient department (OPD) that provides medical consultations and prescriptions, usually during the day. There are at least two shifts, as the OPD is open from 8 a.m. to 10 p.m.; the OPD is staffed with doctors, physicians, nurses, receptionists, and various other related roles. The OPD is the first area of the hospital that needs to be upgraded for its business processes and support systems.
2. The hospital has 10 sophisticated operating theaters. There is a large number of pre- and postsurgical activities (including pre- and postnatal activities). Many processes around the aforementioned activities are not documented. Instead, the staff carries them out based on their knowledge and experience. The processes that require mandatory documentation are not very well supported by the software system. There is an urgent need to upgrade these processes, which include not only dealing with the patients' medical procedures and corresponding legal documentation (such as signing of authority to perform certain medical procedures and nomination of next of kin) but also optimization of facilities management.
3. Diagnostic tests, including blood tests, x-rays, and so on, are carried out on the hospital's premises. However, the ownership and operation of these laboratories are independent of

GoodMead hospital. Therefore, there is a need for coordination and collaboration between the software systems used by the laboratories and HMS.

4. The hospital is continuously in touch with various pharmaceutical organizations that manufacture drugs; this enables the hospital to get the latest information on existing and new drugs and new medical experiments and allows it to provide input on those experiments and trials. Thus, the senior team sees great opportunity for knowledge sharing and collaboration in the areas of provisioning drugs, availability of latest instruments and medical technologies, and exchange of innovative ideas in medical research.
5. Staff-related processes (e.g., checking availability of physicians and surgeons and scheduling nursing and support staff) are not currently optimized. Many processes are manual, and occasionally administrative staff uses physical notepads, diaries, and whiteboards to check the availability of and book doctors. HMS should be able to handle the scheduling of consultations of patients with the respective medical staff and scheduling work rosters for nurses and administrative staff.
6. Internal administrative systems (such as booking of surgeries in operating rooms or leaving schedules of nurses) either use tools such as a local Access database created by people with no software engineering background or, much worse, on whiteboards. These administrative functions are to be moved to the Internet-enabled, cloud-based system that will be managed remotely.
7. Security in terms of storage and access of data and patient privacy have come out on top as key concerns and risks from a legal and compliance viewpoint. The government regulatory specialist on board in this project has advised that patient data are part of a government initiative on electronic medical records (EMRs). The EMR initiative enables sharing of data on the cloud to enable emergency services to access it based on preauthorized IoT devices. Privacy of those data remains on the highest compliance needs of government regulatory bodies and cannot be compromised under any circumstances.
8. User interfaces of the software solutions are specified and designed with usability in mind. HMS is to be used by a wide age range of user groups—young and old, and users with disabilities. HMS needs to comply with the government requirements on the accessibility of the system.
9. Performance and security of HMS are separately specified as nonfunctional requirements and they are part of the agreement between the program director and the board.
10. A range of relative cross-functionalities (such as sports information) needs to be included to attract and keep nonpatients at the site as well. The purpose of it is to keep the community aware. This is part of GoodMead's social responsibility
11. Creating efficiencies in operational processes of the hospital is vital to handling the reduction in charities and partial government funding to the hospital. HMS is meant to provide those operational efficiencies and corresponding metrics and measurements to prove its success.
12. There is no software architecture at all in the hospital. Development of HMS will be based on a robust enterprise architecture that will cover any system that exists within the hospital and then the corresponding system architecture for HMS.
13. A part of this project is the creation of a comprehensive Not only SQL (NoSQL) database that can handle multimedia files. These files contain selected past consultations in audio and video forms, email messages in unstructured format, and summaries of medical journals and newspaper reports. These data and their associated analytics are available to various authorized users such as doctors, consulting doctors, patients, and service providers (such as biowaste cleaners).

14. The use of NoSQL/multimedia databases is a strategic decision that aims to provide optional extensions to the project. This extension is to incorporate the use of remote consultations by doctors and registered nurses through audio and video media using high-speed connectivity.
15. The development process for HMS is to follow composite Agile (CAMS). Thus, the entire HMS development team is trained in the use of Agile and all its associated techniques and practices.
16. Testing of the HMS solution will be carried out both internally and externally (alpha and beta) in an iterative and incremental manner.

A-1: OzAir—Airline Booking System

OzAir LLC

OzAir is a ***hypothetical*** airline operating in a geographically vast yet sparsely populated country in the southern hemisphere (say, in Cairns, Australia). The airline has a loyal customer base that comprises business, tourists, and student communities within the country. OzAir senior management has decided to develop a new airline booking system (ABS) that will be used for ticketing by:

- Individual customers logging directly on the airline's web site itself,
- Staff using the ABS to book customers and their own travel,
- Travel agents booking tours, and
- Business partners (hotels, car rentals, and credit card companies cross-selling air travel).

ABS Project—Background Information

Strategists of the airline conducted a strength-weakness-opportunities-threat (SWOT) analysis to discover that the airline is already under severe threat from social media–based promotion and sales of air travel. Competitors (especially overseas airlines) have implemented comprehensive e-business strategies that are hurting OzAir. The primary aim of OzAir is to develop their entire software solution as an Internet-enabled, cloud-based solution that will handle the airline's external and internal processes entirely online.

OzAir's business strategists are suggesting that the software solution should sell the complete and comprehensive process of the journey, rather than just the ticket. Thus, instead of losing the customers to other businesses (such as car rental and hotels), customers will stay with the airline's e-business portal to complete their journey. ABS is meant to handle not only air tickets online but also offer hotel bookings, auto rentals, food choices, insurance, business meeting minders, etc. Such holistic business processes provide total control over the journey to the customer, increase cross- and up-selling, and provide the ability for OzAir to compete. Developing a comprehensive ABS solution has the best potential for providing a *whole travel experience* especially to cross-cultural customers to make their own choices in traveling.

The current IT support for OzAir is an existing standalone system that provides support for the mostly manual processes for booking airline tickets. The existing system also has a large amount of customer and operational data that are not very well organized—they are mostly dumped into a relational database. ABS needs to interface with this existing system until all business processes are shifted to the new system. Data transition is going to be a major exercise in this project.

OzAir's strategists also have new and emerging technologies in mind. They recommend a back-end cloud-based hosting of ABS data. The strategists also want to incorporate IoT devices for many internal, operational processes (e.g., time keeping, scheduling of pilots' rosters). Bookings and servicing the journey through a smartphone, connecting customers to kiosks for check-in and bag drops, and so forth are part of these strategic requirements.

The new technologies and associated software components influence the ABS requirements from both functional and operational viewpoints. For example, the way a ticket is sold online changes completely by the integration of smartphones with the system.

The actual development of the solution is expected to be carried out by suitable outsourcing partners. The project manager together with the key users must evaluate the work that can be outsourced. The timing of outsourcing the work and ensuring its quality needs to be investigated, discussed, and documented—resulting in a formal service-level agreement.

The senior business decision makers of OzAir believe they have less than 12 months to transform the IT systems and technologies. With impending foreign competition, the business sponsor for the project (the CEO) insists that she should see some results in the next 3 months.

Following are some of the key players involved in ABS. These roles are important from business as well as technology viewpoints:

- Project sponsor—the CEO of OzAir
- Project managers
- Customers (also known as passengers), who are individuals or family groups
- Unaccompanied minors (UMs)
- Customers with special needs (wheelchairs, strollers)
- Touring parties (they are also customers but have special requirements)
- Tour operators
- Pilots and copilots
- Stewards/stewardesses
- Caterers
- Cleaners
- Baggage handlers
- Air bridge operators
- Various roles from business partners (hotel, car rental, insurance)

Note: Additional players can be brought in by the project team depending on the needs of the project as well as improved understanding of the solution being developed.

End of problem statement

A-2: Agro Farm—Farm Management System

Agro Farm Inc.

The following requirements are for a ***hypothetical*** farm in a developing South Asian country (say, on the outskirts of Pune, India) called Agro Farm. This farm is the result of a merger of several small farmers from multiple villages and is now working as a large corporate entity. Agro Farm

is a collaborative farming enterprise that is now in dire need of a sophisticated software system to support its rapidly growing work. The farm management system (FMS) is to be developed in order to provide online real-time support for the numerous routine and unique processes relating to farming.

FMS Project—Background Information

Agro Farm is a conglomerate of many farms working in unison to derive the benefits of farming technologies. FMS is a software system that is designed to support the many farming-related processes. FMS is an online, Internet-based system based on a cloud architecture that is meant to provide value to farmers in many different and challenging conditions of weather, markets, exchange rates (for overseas sales), and legal variations. FMS is to be developed by a group of consultants (***You***), who are supposed to be experienced in the software industry, creating and deploying software solutions for various types of business problems (***You***).

Following are the major requirements of this project:

- Support to the farming community in terms of their planning, strategies, and operations of the farm.
- Enabling collaboration at both individual and farm levels between the many types of farmers in terms of what they should be producing and how they should help each other in production.
- Enhance operational (daily) decision-making between collaborating farms in terms of watering (e.g., optimum time for irrigation), electricity usage, harvest protection (e.g., protection from birds, insects through use of pesticides), and related routines.
- Enable context-based decision-making (creating the context based on the location of a group of people). For example, if the weather forecast changes and it indicates more rain in the coming week than earlier forecast, that information should be disseminated to a large group of farmers through multiple channels (e.g., radio, mobile) and in multiple language formats.
- Enable dynamically changing farming processes depending on the situation (e.g., early rain forecast resulting in preponing the harvesting; or the availability of a larger labor force during certain seasons can be used to plan and carry out harvesting, whereas at other times, such as during festival seasons, there would be no farm activities.
- Provide support in restoration processes (e.g., rejuvenation and restoration of a piece of land after harvesting) through data collection and analysis of similar crop-land-weather combinations. Each piece of land has different requirements for restoration before the next crop can be sowed. This can include activities such as burning of stubs, sprinkling organic restorers, and resting the land.
- Provide support in identifying local and overseas markets for the farming communities based on past data (statistical analysis) as well as changing conditions. This is an important requirement of ABS because currently the farming conglomerate is not able to identify and sell electronically.
- Enable farmers and farming communities to keep up with the myriad changing government regulations and its compliance—both in terms of growing crops and in terms of their sale (especially overseas sale with associated taxes and tax breaks).
- Provide assistance (links and advice) for supporting functions related to finance—such as borrowing, easy repayments, and insurance.

Once you understand and interpret the requirements, you will realize the following major areas in this project (to help you create the architecture):

- Players—these are the actors/users of the system. All systems have actors who aim to achieve their business goals through the system. You are provided a generic description of some of the players. You must identify additional players, name them, and model them in the actor diagram.
- Farming portal (FP) is the portal through which individual farmers and farm groups can undertake informative and collaborative business transactions.
- Regulatory portal (RP), wherein the regulatory compliance is recorded and executed.
- Administrative portal (AP) is accessed by the IT staff to carry out admin functions such as backups and other maintenance functions. With a cloud-based strategy, these functions will reduce as all the data and applications will be hosted, secured, and maintained on the cloud.
- Interactions—this is part of the earlier transaction processing architecture, but here it focuses on service-based interactions that will cut across multiple organizational boundaries/firewalls.

Key Players

There are a number of players (also called stakeholders) in the FMS. These players are typically the people responsible within an organization for the creation and maintenance of information that can be productized. There are also administrative functions wherein the IT staff is responsible for entering and maintaining of farming-related data. The partnering, collaborative farms will access FMS portals to interact, exchange information, and provide combined services.

In addition to the aforementioned end users, there are also administrators of the system, both within the organization and external to the organization, who will be maintaining the data, information, and applications.

The following examples are some of the key players in FMS:

- Farmers—are the main stakeholders in agriculture. They are our business customers for whom our organization provides products or services. Comprising men and women, segmented into different sized (small, medium, or large farms) and type (e.g., wheat, sugarcane, livestock, cotton) of farmers.
- Retailers—buy in bulk and packages and deliver farm produce to end users, i.e., customers.
- Suppliers—provide tools, equipment, and products needed for agriculture; they also lend their services to farmers when needed.
- Sellers and marketers—handle the coordination of sales of Agro Farm's produce. They also take care of the import and export of farm produce. This activity is also carried out by agents who play the role of broker in the farming industry.
- Researchers—a team of people who carry out the agriculture research and see the scope and advent of new technologies, as well as equipment that could be made useful in farming.
- Experts—provide advice to farmers and help support them.
- Local regulators—government officers who look after the rural land acquisitions, sales, manage records and registration.
- Weather forecasters—part of the government sector, and a helping resource to our main stakeholders and local regulators. They provide weather-related updates and information.

Farming Portal

The FP is the portal for end users (clients). This portal is made up of:

- The individual farmer—looking for information about operational (routine) activities to enable him to schedule his day.
- The farm itself—operated by the farmer or his representative—to undertake more strategic activities relating to watering, protecting, and harvesting.
- Collaboration (group) of farms—based on business intelligence for the agricultural domain, the information obtained here will used be to strategize collaboratively for what a group of farmers should do in terms of what to farm (so that they are not competing against each other), when to sow seeds, and when and how to harvest (to ensure distribution of labor, for example).

Regulatory Portal

This is a portal that will be used by government, semigovernment agencies, and government contractors to provide input to farming communities in terms of rules and regulations that can help them with their crop strategies, harvesting, taking advantage of collective bargaining, and complying with rules and regulations. This portal also provides information related to the many tax rules, additional Value Added Tax (VAT)/Goods Services Tax (GST) taxes, and tax breaks.

Administrative Portal

This is the internal portal that enables administration of the system. This portal can include creation of "farms," provision of logins-passwords for individual farms, enabling mobile access over mobile networks, security and protection of data, backups, and archiving of redundant data.

Interactions

The farmer at an individual level and other users (such as regulators) have a need to interact with FMS through various means such as face-to-face contact, phones, and faxes. A need is felt for this interaction to be better supported by providing the staff who handle the interaction with detailed information on the user. The user may be simply enquiring or, alternatively, a registered user of Agro Farm who is calling for or accessing online the information he/she is looking for.

FMS is required to have a call center support module that will handle these calls. Identifying the caller and displaying his/her detailed information to the support staff is crucial for the farmer users. The traditional means of interaction are also augmented by FMS—by improving, documenting, and even analyzing emails, blogs, web site access, and mobile (smartphone) support.

A-3: Desi Travels—Travel Management System

Desi Travels Inc.

These are requirements for a ***hypothetical*** company called Desi Travels. Desi Travels is a small travel agency in the middle of a large and bustling city (say, New York City) employing about 15–20 people. Desi Travels specializes in personalized group tours for various exotic locations in Africa, South Asia, and Australia. The owner of Desi Travels is an avid traveler, and has been on

long and exciting journeys herself. The owner is aware of the need to use technologies to promote and grow her business.

Desi Travels is now developing a travel management system (TMS). TMS will provide online real-time support to the company and to all its associated travel agencies that will enable them to carry out their numerous routine travel and tourism processes; more importantly, though, TMS will enable collaboration between Desi Travels, the various other travel agencies, and the various regulatory bodies (such as those offering travel visas).

TMS Project—Background Information

The senior decision maker of this project is the owner/CEO. She is aware of the impact of Internet connectivity in the travel business. For example, the owner/CEO is keen to have a substantial web presence, undertake social media marketing (e.g., through Facebook and Twitter to reach out to the younger traveling generation), search engine optimization (by setting up alliances with, say, Expedia™ or TripAdvisor™, for example), and the use of smartphones (e.g., location-based services).

Currently, Desi Travels has a very basic, informative web site. This site is hosted by another small service provider run by a couple of family members. This basic web site provides information on the physical location of the company, contact details, upcoming journeys, and planned tour packages. Desi Travels' foray in the technology world is restricted to this basic informative web site and a mobile phone with each of its employees.

Desi Travels finds the need to create new and ongoing contents and provide services through many different permutations and combinations. For example, Desi Travels wants to offer packages that combine a spice tour of India with cricket world cups. The company is already extending its offerings of packaged tours for other sporting events such as the Olympics and soccer world cups.

The owner also knows that her current and future customers are increasingly becoming "smarter" in terms of their mobile usage and are looking for more choices and options that are available while they are traveling on and through their mobile devices. This increasing demand from customers requires the travel agency to raise its game and provide mobile-specific contents and services to its traveling customers. Furthermore, with alliances with associated businesses like airlines and hotels, there is a need for solid business to business (B2B)connections and communications.

The new TMS is meant to support the aforementioned travel processes. TMS is an online, Internet-based system based on a cloud architecture that is meant to provide direct value to the customers of Desi Travels in many different and widely varying conditions.

TMS is to be developed by a group of consultants (***You***), who are supposed to be experienced in the software industry, creating and deploying software solutions for various types of business problems. ***You*** are capable of modeling, architecting, and designing the solution for such a system.

What follows are the major requirements of this project:

- Enable collaboration between Desi Travels and many other companies (e.g., hotels, cars)
- Enhance operational (daily) decision-making by the owner based on integration between the Desi Travels and other agencies (such as legal, weather, accounting)
- Enable context-based decision-making (creating the context based on the location of a group of travelers at a particular location). For example, if the weather forecast changes and it

indicates more rain in the coming week than earlier forecast, that information should be disseminated to the staff, who can then appropriately detour the travel coach/group.
- Provide on the site information in multiple languages (e.g., English, Spanish, French, Mandarin, Hindi)
- Support in identifying travel package opportunities through data analytics based on past data (statistical analysis) as well as currently changing travel conditions
- Enable the travel consortium to keep up with the myriad changing government regulations and compliance with them
- Provide assistance (links and advice) for supporting functions related to financing travel loans, facilitating easy repayments, and offering travel insurance in varied formats
- Provide system support in terms of planning, strategies, and operations of Desi Travels

Once you understand and interpret the requirements, you will realize the following major areas in this project (to help you create the architecture):

- Players—these are the actors/users of the system. All systems have actors who aim to achieve their business goals through the system. You are provided a generic description of some of the players. You must identify additional players, name them, and model them in the actor diagram
- Travel portal (TP)—the portal through which current and prospective travelers can undertake informative and collaborative business transactions
- Regulatory portal (RP)—deals with the myriad current and upcoming laws that impact travel business both within India and overseas; access to this portal will be available to the lawyer and accounting firm hired by Desi Travels
- Administrative portal (AP)—accessed by Desi Travel staff to carry out admin functions such as backups and other maintenance functions. With a cloud-based strategy, the AP may simply provide access to the Desi Travel server on the cloud to undertake archives, for example.
- Interactions—this is part of the earlier transaction processing architecture, but here it focuses on service-based interactions that will cut across multiple organizational boundaries/firewalls

Key Players

There are a number of players (also called stakeholders) in the TMS. These players are typically the people responsible within an organization for creation and maintenance of information that can be productized. There are also IT-related administrative functions wherein administrators of the system, both within the organization and external to the organization, will be maintaining the data, information, and applications.

What follows are examples of some key players in TMS:

- Potential traveler—enquiring about a tour
- Traveler—known to Desi Travels (each traveler has a profile made up on personal details (name, address, etc.) and trip details)
- Staff—provide services to travelers
- Social media specialist—will carry out the travel research, record, and analyze social media data and provide support to the owner in putting together new travel packages
- Legal experts—provide advice on visa and immigration requirements

A-4: Lucky Insurance—Insurance Management System

Lucky Insurance Co.

Lucky Insurance is a ***hypothetical*** company operating out of the insurance capital of the world (say, Hartford, CT, USA). The company has a wide and loyal customer base that ranges from parents of young families to corporations. The last two decades have seen phenomenal growth in the company base through two large acquisitions and compliance-driven corporate insurances.

Lucky is now finding that the lack of appropriate and sufficient customer service is causing it to increasingly lose its valued clients. Competition from rivals is intense—especially as many competitors have implemented the latest technologies including cloud-based hosting and highly sophisticated customer call centers fully integrated with descriptive and predictive analytics within their customer relationship management systems (CRMS). Lucky Insurance realizes that it is now in catch-up mode and, subsequently, its board has taken an executive decision to proceed with an off-the-shelf, Internet- and mobile-enabled, analytics-driven new insurance management system (IMS).

Background Information on the Project

IMS is a software system to be designed to support the many insurance-related processes with Lucky Insurance. IMS is an online, Internet-based system based on a cloud architecture wherein data are entirely stored in the background on the cloud. The senior management (board) of Lucky has highlighted the following major points in this project:

- Provide the ability to create basic insurance quotes for homes, contents, cars, and travel. These quotes are created online by a prospective client without staff intervention. A client may seek an individual quote or a combination (e.g., home and contents, or car and travel).
- Ability to commence insurance coverage once payment has been received (that is when a quote has been converted to a policy).
- Enable a variety of payment options including checks, credit cards, direct debits, BPAY, PayPal, and so on.
- Provide phone and face-to-face support to customers (and prospective customers) who may need to ask questions (related to the product and to their policies, claims, settlements, etc.).
- Print policy reports and certificates.
- Manage the process of making a claim and its settlement, including and especially smartphone-based reporting of events and submission of initial claims.
- Track claims to ensure all parties are aware of the progress of the claims.
- Fulfill claims by providing the actual amounts to satisfy claims and record their details.
- Investigate fraud of possible false claims based on analytics.

Once you understand and interpret the requirements, you will realize the following major areas in this project (to help you create the architecture):

- Players—these are the actors/users of the system. All systems have actors who aim to achieve their business goals through the system. You are provided a generic description of some of the players. You must identify additional players, name them, and model them in the actor diagram.
- Client portal (CP)—the organizational client's portal that will be used by both corporate and individual clients to undertake business transactions with the organization.

- Employee portal (EP) provides services to all individual employees from the user end. Therefore, this is the client end of what used to be the client-server architecture.
- Administrative portal (AP)—accessed by Hartford Insurance Company (HIC) staff to carry out admin functions such as creation of new products and their maintenance.
- Interactions—part of the earlier transaction processing architecture, but here it focuses on service-based interactions that will cut across multiple organizational boundaries/firewalls.

Key Players

There are number of players (also called stakeholders) in the IMS. These players are typically the people responsible within an organization for the creation and maintenance of insurance products. There are also administrative functions wherein IMS IT staff is responsible for entering and maintaining insurance-related data. Furthermore, it is expected that partnering, collaborative organizations will be accessing the IMS portals to interact, exchange information, and provide combined services.

In addition to the aforementioned end users, there are also administrators of the system, both within the organization and external to the organization, who will be maintaining the data, information, and applications.

Client Portal

The CP is organizational client's portal that will be used by both corporate and individual clients to undertake business transactions with the organization.

- Whatever is insured by IMS is called a "risk" in insurance parlance. Therefore, all insurance policies are taken out by clients to insure them against a particular "risk."
- Potential clients (which also include existing clients who are taking out a different type of insurance) start with a quote. To receive a quote, they need to provide complete and correct details of the "risk" item for which they want the cover. For example, a vehicle insurance quote would necessarily involve the make, model, registration, extras type details, as well as details of the driver, age, experience of driving, claims history, etc. An important need of the system is that in addition to providing quotes online, the software should also be capable of converting quotes into policies, thereby avoiding duplication of information. At the end of a detailed quote, clients are provided with a dollar figure as the premium amount. This is the amount the clients must pay if and when they decide to proceed with the insurance coverage.
- A policy insures a risk. A policy can cover more than one risk (e.g., a car and a home). Policies are also issued for a part of a risk (an item, e.g., only for the stereo in a car or jewelry in a home). Policies are issued on a monthly, quarterly, semiannual, and annual basis. Policies are governed by regulations, requiring details of the insurance to be documented formally and provided to the respective government organization through an interface to their software system. This information includes what is being insured, sum for which it is insured, excess payments and details of the conditions under which excesses have to be paid, and, most importantly, the terms and conditions under which Lucky Insurance is obliged to cover an item even if premiums have not been paid. For example, in life coverage, the person is covered even if premiums are not paid for a quarter, provided the arrears premiums are paid in the event of a claim. Another example is of a motorcycle whose risk is covered with a

coverage note, even if the premium is not yet paid. There is additional need to interface with other government departments that help in legal issues, as well as departments that interact with hospitals and the police. This interaction becomes important if a claim runs into dispute and more so if it is a claim related to workers' compensation for injuries on work sites.

- While individuals deal directly with Lucky Insurance for the most part, organizations that deal with Lucky Insurance do so through one or two of their nominated representatives. These representatives are usually the employees of the client organization dealing with Lucky Insurance. Individuals can also nominate their representatives, especially in cases of life insurance, wherein representations are required for a client who may not be physically capable of representing himself or, at worst, may not be physically around. There are thus people who represent a range of roles they play in dealing with Lucky Insurance, representing either themselves as personal clients, while others represent their organizations.
- Insurance premiums can be paid in numerous ways, including by credit cards, checks, cash, or BPAY. The frequency of payment can also be determined by the client—on a daily, weekly, fortnightly, monthly, quarterly, half-yearly, or yearly basis. Premium payments can be automatically renewed or may need a signature for renewal.

Employee Portal

In addition to dealing with clients, Lucky Insurance's senior management also wants a substantial spin-off benefit of putting the employee details in the IMS. This would include the name, address of the employees, and other contact details, as well as the workers, compensation details. Leave accrued, salaries, taxes, and such details once placed in the employee portal will substantially reduce the administrative overheads of Lucky Insurance and improve information flow among employees.

Lucky Insurance also uses many "contract" staff. There is a need to be able to manage their timesheets in an effective manner. Using the employee portal would free the management from routine timesheet management, and an interface with accounting department would speed up processing of invoices and payments. Eventually, this part of the software solution, called the employee portal (EP), can also be tailored to handle internal career tracking and management for employees. Thus, EP is entirely dedicated to individual employees to enable them to self-manage their activities within IMS.

Typically, an employee would take the following steps:

- Register on the system
- Provide details
- Undertake leave, training, etc.
- Manage pay slips
- Undertake printing

Administrative Portal

This is the background portal that enables administration of the system. This portal also enables administrative activities relating to customers, employees, and management.

- Send email and SMS to clients about their registration on the system
- Manage different insurance policies (this is an administrative function such as keeping the old products on, backing up data, and so on)
- Confirm registration of new users of the system

Interactions

Clients, both personal and organizational, also have a need to continue to interact with Lucky Insurance by traditional means of face-to-face contact, phones, and faxes. A need is felt for this interaction to be better supported by providing the staff who handle the interaction with detailed information on the caller—especially if the caller is "known" to the organization. This would first require software support in identifying the caller followed by detailed information on the caller to be flashed on system screens in front of the staff once the caller has been identified. Furthermore, the traditional means of contacts will no longer suffice. There is a need to facilitate client contact with IMS through emails, on the company web site, and very soon through mobile technologies. This demand to enhance interaction through new technologies is not only the need for IMS's business people, but also for its clients—especially large corporate clients who want to automate the process of inquiries, payment of premiums, and lodgments of claims with IMS.

Business managers at Lucky Insurance realize the acute need to free their crucial sales staff from answering mundane and routine inquiries, so that they can pursue genuine leads. Therefore, they want a sophisticated inquiry facility on their web site that will not only provide regular information to clients and potential clients but also provide some basic calculations on quotes for premiums. A quick market survey indicates that existing clients as well as many potential clients prefer Internet-based access to information, doing some basic calculations and comparisons, and also making routine payments of premiums (e.g., through BPAY, or periodic charges to credit cards).